Lumholtz (6) & Hrdlicka (A.)

TREPHINING IN MEXICO

BY

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TREPHINING IN MEXICO

CARL LUMHOLTZ AND ALEŠ HRDLICKA

I

During my last expedition to Mexico for the American Museum of Natural History of New York (1894–1897) I (Lumholtz) traveled for some time among the Tarahumares in the southern part of Chihuahua. For about a fortnight I stayed in a remote section of the Sierra Madre, called by the Mexicans *Pino Gordo* on account of its magnificent pine trees, about one and a half days' journey to the north of the once well-known mining place of Guadalupe y Calvo. Through this district there leads a lonely trail, which is used perhaps once a month by Mexicans living at the Guachochic ranch when journeying to Guadalupe y Calvo. Here in the adjoining deep barrancas live the Indians, who are all Tarahumares, being rarely disturbed by the whites. They are all "*gentiles*," the name applied by the Mexicans to heathen Indians who do not frequently come in contact with the whites, and from whom, naturally, I always got the best results. Not only are they the best subjects for study, but, having been less corrupted by advancing civilization, they are far more obliging when one succeeds in gaining their confidence than those who have lost their natural naïveté by Caucasian contamination.

On the occasion referred to, the principal man of the district, who had become attached to me, showed me a burial cave. I had persuaded him that it was better that I should take away the bones contained in it in order to keep them in a good house than that they should remain where they were, "killing sheep and making people sick." "But why do you want them?" he

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asked. Having been satisfied on that point, he one day led the way to a wild, steep arroyo, pointed at its head, and, having thus indicated where the cave was, at once left me. I made my way the best I could up this steep little gorge, accompanied by one of my men. On arriving at the top of it I found the entrance to the cave completely covered with stones plastered together with mud. A great heap of stones was also piled up outside against the wall.

The cave was found to be very small, and, contrary to the exaggerated reports of the Indians, it contained only three skeletons. According to the custom prevailing throughout most of the country of the Tarahumares, these remains had not been buried, but the skeletons were lying on their backs, their skulls turned toward the east. A few crudely made clay vessels of the ordinary Tarahumare type accompanied the skeletons. On gathering the three skulls I was at once struck by a circular hole in the right parietal bone of one of them. As they undoubtedly belonged to the Tarahumare, the question at once occurred to me, Could it be possible that this barbaric tribe, not particularly advanced in the arts, was capable of trephining? The remoteness of the place entirely negatives the suggestion that a civilized surgeon could have had anything to do with it.

The skull (figures 1, 2, 3), of which the lower jaw is missing, is that of a female over 60 years of age. It is impossible to arrive at the age of the specimen, on account of the peculiar circumstances in which it was preserved; however, the cranial walls still contain some animal matter, they are still somewhat fatty to touch, and retain some odor. A spindle (provided with a whorl made from a piece of pine bark) which was lying among the bones in this cave indicates that the body of this female had not been put there in recent times. This variety of whorl, so far as we can ascertain, has not been observed among the Tarahumares of the present day; it is indeed possible that the skeleton may be pre-Columbian.

The skull does not present any deformities or fractures, nor is there anything pathological about it. There are no traces of any injury on either of the skull tables; it shows, however, evidences of a superficial injury of the bone at about the middle of the junction of the right parietal with the occipital.

The singular aperture is situated in the anterior and superior

FIG. 1—TREPHINED TARAHUMARE SKULL, FEMALE

Seen from above

Am. Mus. Nat. Hist., New York, Lumholtz Coll.

FIG. 2—TREPHINED TARAHUMARE SKULL, FEMALE

Seen from one side

Am. Mus. Nat. Hist., New York, Lumholtz Coll.

part of the right parietal bone, 1.3 cm. back of the coronal, and 2.3 cm. below the sagittal suture. It is almost exactly round, measuring 2 cm. in diameter; and the regularity of the hole in-

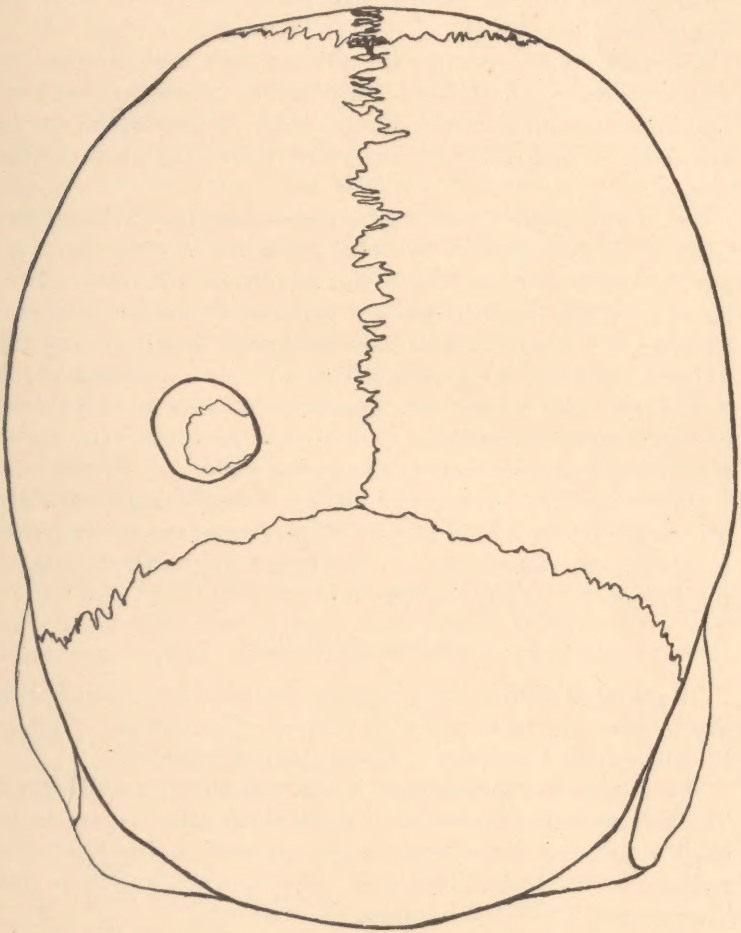

FIG. 3—TREPHINED TARAHUMARE SKULL, FEMALE

Am. Mus. Nat. Hist., New York, Lumholtz Coll.

dicates without a doubt that it is artificial. The outer edge of the hole is smooth and somewhat sunken, the parietes ascending from it; the inner edge is partly obliterated by a lamella of thin bone which proceeds from all parts of the inner edge to the

center, and whose free edge is very sharp and irregular. Viewed from the inside of the skull, this lamella appears smooth, and directly continuous with the inner skull surface. It is very probable that part, at least, of this lamella remained after the wound had been made.

The walls of the opening are quite smooth and are covered with a compact bony tissue. This fact, in connection with the smooth and slightly sunken external edge, shows that the wound was made a long time, several years, before the death of the person.

One would expect that trephining among the Tarahumares would have been done in the most primitive way, by scraping; but the almost circular form of the opening, and its perpendicular walls, which show no signs of beveling, do not admit of this conclusion. The senior author has never found among the Tarahumares any implement which afforded a suggestion that it had been used for such an operation. At present they do not use any stone implements except plowshares, and the art of trephining has apparently become obsolete.

One is forced to believe that the case of trephining in question was produced by a kind of flint wimble with three teeth, very much like the instruments of iron used today in trephining by the Berbers of l'Aurés (Lumholtz).[1]

Description of the Skull

The skull is slightly more massive than are the average female skulls from the same tribe of people. The parietes range in thickness from 4 to 5 mm. There is no asymmetry.

The forehead of the cranium is low, though fairly well arched. The sagittal region is somewhat elevated from the bregma to the obelion, forming a low, wide ridge, rounded on the top. The parietal bosses project but little. The temporal region is full. The occiput is full, the inion region prominent.

The base of the skull is flatter than normal. The basal processes are of a medium strength; the styloids 1.65 cm. long, of medium thickness. The mastoids are small. The foramina are all of a good size, the internal auditory meati larger than the

1 See an interesting article by Drs Henri Malbot and R. Vernau, "Les Chaouias et la trepanation du crane dans l'Aurés" (vol. II, "Revue d'Anthropologie," 1897), in which an illustration of this implement is given.

average. The right jugular foramen is large. The posterior nares are regular, slightly broader than high (*vide* measurements). The zygomatic arches are of a medium expanse. The palate is elliptical in shape and regular.

The supra-orbital ridges are small; glabella low, slightly convex; nasion depression small. The nasal bridge is rather low and very concave. The orbits are regular, their borders of medium sharpness, the right slightly broader. The long axes of their exterior planes meet about 3 mm. above the ophryon. The malars are small in size, but quite massive and prominent, especially at their upper (orbital) border; canine fossæ medium; nasal aperture wide; spine low, 0.8 cm. long, small echancrures on both sides of it; upper dental arch almost completely absorbed.

The cranial sutures show a rather simple serration. The pterions are formed *en H* (medium breadth). There is a large epactal bone (11.5 × 3.4) at lambda; no wormians. The ossification is much advanced, and comprises, from before backward, all the nasal and most of the orbital sutures, all the coronal except the parts between the two temporal ridges on each side, both pteric, anterior third of sagittal and around obelion, most of the temporo-parietals, a spot in the lambdoid on right, and the right temporo-occipital.

All the cranial measurements, as well as the type of the skull, agree well with those of the average female Tarahumare. These measurements are given in full for the sake of completeness.

Measurements

Capacity (Flower's method)	1,210	cc.
Diameter anterio-posterior maximum	17.5	cm.
Diameter lateral maximum	13.0	"
Cephalic index (dolichocephalic)	74.3	
Nose: Height	4.45	"
Breadth	2.95	"
Nasal index (platyrhinic)	66.3	"
Orbits: Height (mean)	3.55	"
Breadth (mean)	4.05	"
Orbital index (mesoseme)	87.6	
Face: Height indeterminable on account of the absorption of the upper dental arch.		
Widths: Diameter frontal minimum	9.4	"
" external orbital	10.2	"
" bijugal	10.8	"
(Bizygomatic maximum	12.7	")

Cranium: Widths: Diameter bistephanic	11.0	cm.
" biauricular (vertically above meati)	12.1	"
" between the centers of parietal bosses	12.6	"
" bimastoid	10.3	"
Arcs: Centers of ext. aud. meati, over forehead	28.8	"
" " " over frontal bosses	29.3	"
" " " over bregma	31.0	"
" " " over max. expanse of cranium	32.2	"
" " " over lambda	29.0	"
" " " over inion	24.8	"
Nasion-ophryon	1.7	"
" -bregma	11.5	"
" -lambda	23.0	"
" -inion	30.0	"
" -opisthion	35.6	"
Circumference max. of the skull	49.8	"
Rayons: Basion subnasal point	8.8	"
" -nasion	9.6	"
" -bregma	12.4	"
" -obelion	12.0	"
" -lambda	11.1	"
" -inion	8.1	"
(Length-height index	70.8)	
Distance of true temporal ridges from bregma (along the coronal suture)	8.0	"
Foramen magnum: Diameter ant.-post.	3.3	"
" lateral maximum	3.0	"
Index	90.9	
Posterior-nares: Height maximum	2.63	"
Breadth in middle	2.75	"
Index	104.5	

II

Since the above article was written and read before the American Association for the Advancement of Science at its meeting in Detroit, 1897, as well as before the British Association for the Advancement of Science at its meeting in Toronto, 1897, another instance of trephining among the Tarahumares has come to the notice of the authors.

FIG. 4—TREPHINED TARAHUMARE SKULL, FEMALE
Seen from above
Mus. of Science and Art, Philadelphia, Lumholtz Coll.

FIG. 5—TREPHINED TARAHUMARE SKULL, FEMALE
Seen from one side
Mus. of Science and Art, Philadelphia, Lumholtz Coll.

This second trephined skull (figures 4, 5) is one of that part of the Lumholtz collection, which is in possession of the Museum of Science and Art in Philadelphia. It was obtained by Mr Lumholtz from a burial cave near the pueblo of Nararachic, state of Chihuahua, and the trephining was discovered by Dr Hrdlicka during his examination of this part of the Lumholtz collection.

The skull presents many similarities to the one first described, and, like that, it is the skull of a female about fifty years of age. Its physical characteristics, though not exactly the average, are nevertheless distinctly those of a female Tarahumare (cephalic index, 77.4; nasal index, 54.6; orbital index, 83.8); moreover, the physical characteristics of all the other skulls from the same locality agree with those of the Tarahumare.

The orifice in the skull is also situated, as in the first case, in the forepart of the right parietal. It is in this instance (measuring from the center of the opening) 2.6 cm. behind the coronal suture and 5.0 cm. below the sagittal suture.

The opening itself, however, is not round, as in the first case, but oval or almond-shape, with the blunt point forward; and the edges, which are very regular and uniform, are distinctly beveled.

The opening in its present state is almost filled with new bone, which indicates a long survival of the subject after the operation. Its size, as shown by the somewhat different color of the new bone, was about 2.2. cm. by 1.6 cm. The anterior part of the wound is much more filled than the posterior; this latter presenting a depression of the size of about one-third of the whole original opening, partly filled with cancelous bone. In the lower part of this depression there is still preserved a slit-like communication with the interior of the skull.

The parietal bone in which the opening is situated shows absolutely no sign of injury. The edges of the opening, as already stated, are regular, without any nodules, and there is no trace of any healed depression or fracture. The inner table of the skull at the place of the opening shows a number of little radiations, which diverge from the slit mentioned, indicating that otherwise this inner table is smooth, and shows no injury nor anything pathological.

That the trephining was done many years before the death of the subject, and probably in youth, is further indicated by a

slight alteration of the whole right side of the head posterior to the wound. (The right side is somewhat larger than the left and seems slightly lower.)

That the wound was made by trephining, a minute and thorough examination shows beyond doubt. The method of opening the skull in this case differed, however, from that employed in the first one. The shape of the wound and the beveled edges, for which natural absorption alone could not sufficiently account, prove that in this instance the trephining was accomplished by scraping.

The finding of a second case of trephining among the Tarahumares shows that this operation was not solely accidental with these people, but that the art, even though rare, was well known to them and even practiced according to various methods.

Regarding the aim of the operation, the two specimens described offer no indication; but there are coincidences in both cases, viz, that both skulls were those of women, and that the opening in both was in the right parietal bone (a place which is very easy of access and involves comparatively little danger for such an operation); further, the absence in both cases of signs of cranial wounds and the long survival of the subjects after the operation. All these facts have a certain significance, which may possibly be elucidated in the future by the finding of other specimens.

Whence the knowledge of trephining among the Tarahumares was derived—whether from the peoples of the north or from those of Peru and Bolivia (countries prolific in specimens of this kind) or from some source common to all of these—must yet remain an open question.